CLAIMS

What is claimed is:

1.   A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a compression target, and outputs a code corresponding to the code vector, characterized in that

the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

2.   A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a compression target, and outputs a code corresponding to the code vector, characterized by comprising:

block shift means for extracting the block forming the vector of the compression target from the compression target while shifting a spatial position in a horizontal direction at least between blocks close to each other in a vertical direction.

3.   A data compressing device according to claim 2, characterized in that the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

4.   A data expanding device which uses a data

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string including at least one unit of data as a
vector, searches a code book having at least one code
vector for a code vector corresponding to a
compression code, and allocates the code vector to a
corresponding block position to reconstruct original
data, characterized by comprising:

block shift means for allocating the block
constructing the code vector searched from the code
book while shifting a spatial position in a
horizontal direction at least between blocks close to
each other in a vertical direction.

12. A data expanding device according to claim 11,
characterized in that the block forming the vector is
a line block in which data positions are
one-dimensionally arrayed.

13 14. A data compressing/expanding system which
segments a data string including at least one unit of
data into blocks forming vectors, in data compression,
searches a code book prepared in advance for a code
vector similar to a vector extracted from a
compression target and outputs a code corresponding
to the code vector, and in data expansion, searches
the code book for a code vector corresponding to the
code and allocates the code vector to a corresponding
block position to reconstruct original data,
characterized by comprising at least one of:

first block shift means for, in the data
compression, extracting the block forming the vector

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of the compression target from the compression target
while shifting a spatial position in a horizontal
direction.at least between blocks close to each other
in a vertical direction; and

second block shift means for, in the data
expansion, allocating the block of the code vector
searched from the code book while shifting the
spatial position in the horizontal direction at least
between the blocks close to each other in the
vertical direction.

14 ~~16~~. A data compressing/expanding system according
to claim ~~7~~ ~~14~~ 13 characterized in that the block forming
the vector is a line block in which data positions
are one-dimensionally arrayed.

15 ~~17~~. A data compressing/expanding system according
to claim ~~66~~ 14 or ~~7~~ 14, characterized in that block shift
by said first block shift means and block shift by
said second block shift means have the same shift
amount in opposite directions.

9. A data compressing device which segments a
data string including at least one unit of data into
blocks forming vectors, searches a code book prepared
in advance for a code vector similar to a vector
extracted from a compression target, and outputs a
code corresponding to the code vector, characterized
by comprising:

first vector quantizing means for, for data at
each time in the compression target which changes

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32. A code book making method of making a code book which is formed from a set of vectors as data strings each including at least one unit of data and is to be used for vector quantization, in which vector quantization processing is repeatedly executed using sample data and an initial code book, and contents in a range designated on a virtual two-dimensional plane of the code book are updated in accordance with a predetermined update coefficient for every processing step so as to optimize the code book, characterized in that:

the code book for units of sample data is independently optimized and code books obtained are synthesized to make a new code book.

33. A code book making method according to claim 32, characterized in that, in independently optimizing the code book for the units of sample data, the code book is made according to said method of any one of claims 28 to 31.

33.
34. A data compressing device according to ~~any one of claims 1 to 3, 9 to 14, 18, 20 and 21, and 25 to 27~~, characterized by further comprising:

Claim 3

feature amount storage means for storing a feature amount obtained in advance for each code vector in the code book;

feature amount calculating means for obtaining a feature amount of the vector extracted from the compression target; and

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calculation omitting means for determining whether calculation for obtaining similarity between each of the code vectors and the compression target vector is to be omitted on the basis of the feature amount of each code vector, which is stored in said feature amount storage means, and the feature amount of the compression target vector.

35. A data compressing device according to claim 34, characterized in that the feature amount is a sum, an average value, or DC components of values of the data string constructing the vectors.

36. A data compressing device according to claim 34, characterized in that the feature amount is a sum, an average value, or DC components of values of some elements of the data string constructing the vectors after the values are operated and inverted with reference to an intermediate value of possible values.

37. A data compressing device according to claim 34, characterized in that the feature amount is a direction of change in a block of values of the data string constructing the vectors.

38. A data compressing device according to claim 34, characterized in that the feature amount is a form of change in a block of values of the data string constructing the vectors.

39. A data compressing device according to ~~any one of claims 34 to 38~~, characterized in that said calculation omitting means comprises

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absolute difference value calculating means for
obtaining an absolute difference value between a
feature amount of a certain code vector and the
feature amount of the compression target vector, and

omission determining means for, when the absolute
difference value obtained by said absolute difference
value calculating means is larger than a minimum
value of a value representing similarity, which is
already obtained for another code vector, omitting
similarity calculation for the certain code vector.

10.
~~40~~.   A data compressing device according to ~~any
one of claims 1 to 3, 9 to 14, 18, 20 and 21, and 25
to 27~~, characterized by further comprising: Claim B

feature amount storage means for storing feature
amounts of different types, which are obtained in
advance for each of the code vectors in the code
book;

feature amount calculating means for obtaining
the feature amounts of different types for each
vector extracted from the compression target; and

calculation omission means for determining for
each of the code vectors whether calculation for
obtaining similarity to the compression target vector
is to be omitted, on the basis of the feature amounts
of different types for each code vector, which are
stored in said feature amount storage means and the
feature amounts of different types for the
compression target vector, which are obtained by said

feature amount calculating means.

41. A data compressing/expanding system comprising a code book server for holding at least one code book, a data compressing system, and a data expanding system, characterized in that

said code book server supplies one of the held code books in accordance with a request from said data compressing system or said data expanding system.

42. A data compressing/expanding system according to claim 41, characterized in that said code book server comprises:

code book holding means for holding at least one code book;

code book making means for making a code book matching the request from said data compressing system or said data expanding system; and

code book management means for supplying the code book held in said code book holding means or the code book made by said code book making means in accordance with the request from said data compressing system or said data expanding system.

43. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized in that

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the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

17. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized in that:

the block forming the vector of the compression target is extracted from the compression target while shifting a spatial position in a horizontal direction at least between blocks close to each other in a vertical direction.

18. A data compressing method according to claim 17, characterized in that the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

20. A data expanding method in which a data string including at least one unit of data is used as a vector, and a code vector corresponding to a compression code is searched from a code book having at least one code vector and allocated to a corresponding block position to reconstruct original data, characterized in that:

the block constructing the code vector searched from the code book is allocated while shifting a spatial position in a horizontal direction at least

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between blocks close to each other in a vertical direction.

24. A data expanding method according to claim 16, characterized in that the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

25. A data compressing/expanding method in which a data string including at least one unit of data is segmented into blocks forming vectors, in data compression, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, and in data expansion, a code vector corresponding to the code is searched from the code book and allocated to a corresponding block position to reconstruct original data, characterized in that:

in the data compression, the block forming the vector of the compression target is extracted from the compression target while shifting a spatial position in a horizontal direction at least between blocks close to each other in a vertical direction; and

in the data expansion, the block of the code vector searched from the code book is allocated while shifting the spatial position in the horizontal direction at least between the blocks close to each other in the vertical direction so that the shift

amount becomes the same as in the data compression, and the direction is opposite to that in the data compression.

49. A data compressing/expanding method according to claim 48, characterized in that the block forming the vector is a line block in which data positions are one-dimensionally arrayed.

50. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized by comprising:

the first vector quantizing step of, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching a first code book for a code vector similar to the vector, and outputting a code string corresponding to the code vector at each time;

the code string rearrangement step of, of the code strings output in the first vector quantizing step at each time, combining codes at a corresponding address between units of data at each time to generate new vectors; and

the second vector quantizing step of, for each of the new vectors generated in the code string rearrangement step, searching a second code book for

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where the correlation is smaller than a predetermined value.

58. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized in that:

a code book for luminance signals and a code book for chrominance signals are prepared, said code book for luminance signals being assigned a larger number of code vectors than said code book for chrominance signals.

59. A data compressing method according to claim 58, characterized in that a compression rate of a Y signal as the luminance signal and U and V signals as the chrominance signals is 4 : 1 : 1 or 4 : 2 : 2.

60. A data compressing method according to any one of claims 43 to 45 and 50 to 59, characterized in that a feature amount extracted from the compression target is compared with a feature amount related to each code vector in the code book, and on the basis of a comparison result, calculation for obtaining similarity between the code vector and the compression target vector is omitted.

61. A data compressing method according to claim 60, characterized by further comprising:

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the absolute difference value calculating step of obtaining an absolute difference value between a feature amount of a certain code vector and the feature amount of the compression target vector, and

the omission determining step of, when the absolute difference value obtained in the absolute difference value calculating step is larger than a minimum value of a value representing similarity, which is already obtained for another code vector, omitting similarity calculation for the certain code vector.

62. A data compressing method according to claim 60 or 61, characterized in that, using feature amounts of different types, it is determined for each of the code vectors whether calculation for obtaining similarity to the compression target vector is to be omitted, on the basis of the feature amounts of the above types and feature amounts of the types extracted for the compression target vector.

63. A data compressing/expanding method in a data compressing/expanding system comprising a code book server for holding at least one code book, a data compressing system, and a data expanding system, characterized in that

the code book server supplies one of the held code books in accordance with a request from the data compressing system or the data expanding system.

64. A computer-readable recording medium

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characterized in that said recording medium records a program for causing a computer to realize the function of claim 1.

65. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to function as said means of any one of claims 2, 9, and 13.

66. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to function as said means of any one of claims 9 to 25.

67. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to execute a processing procedure of said code book making method of any one of claims 29 to 32.

68. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to function as said means of claim 34 or 40.

69. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to realize the function of claim 41.

70. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to execute the step of any one of claims 50 to 52, 54, and 57.

71. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to execute a processing procedure of said data compressing method of claim 56 or 60.

72. A computer-readable recording medium characterized in that said recording medium records a program for causing a computer to execute a processing procedure of said data compressing/expanding method of claim 63.

73. A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a compression target, and outputs a code corresponding to the code vector, characterized by comprising:

vector quantizing means for, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching the code book for a code vector similar to each of the vectors, and outputting a code string corresponding to the code vectors at each time; and

output control means for, for feature amount of each code vector searched by said vector quantizing means at each time, obtaining correlation between feature amounts at a corresponding address between units of data adjacent in the time-axis direction and

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along a time axis, extracting blocks from the data,
searching a first code book for a code vector similar
to the vector, and outputting a code string
corresponding to the code vector at each time; and

second vector quantizing means for rearranging
code strings output by said first vector quantizing
means at respective times to generate new vectors,
and for each of the new vectors, searching a second
code book for a code vector similar to the vector,
and outputting a code string corresponding to the
code vector.

10. A data compressing device according to claim
9, characterized by further comprising code string
rearrangement means for, of the code strings output
from said first vector quantizing means at each time,
combining codes at a corresponding address between
units of data at each time to generate new vectors.

11. A data compressing device which segments a
data string including at least one unit of data into
blocks forming vectors, searches a code book prepared
in advance for a code vector similar to a vector
extracted from a compression target, and outputs a
code corresponding to the code vector, characterized
by comprising:

first vector quantizing means for, for data at
each time in the compression target which changes
along a time axis, extracting blocks from the data,
searching a first code book for a code vector similar

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to the vector, and outputting a code string
corresponding to the code vector at each time; and

second vector quantizing means for defining, as a
reference code string, a code string of data at a
certain time in the code strings output from said
first vector quantizing means at respective times,
rearranging difference results each calculated for
codes at a corresponding address between the
reference code string and a code string of data at
another time so as to generate new vectors, and for
each of the new vectors, searching a second code book
for a code vector similar to the vector, and
outputting a code string corresponding to the code
vector.

12.   A data compressing device according to claim
11, characterized by further comprising code string
rearrangement means for, of the code strings output
from said first vector quantizing means at each time,
defining the code string of the data at the certain
time as the reference code string, calculating a
difference for the codes at the corresponding address
between the reference code string and the code string
of the data at another time, and combining the
differences at the corresponding address to generate
new vectors.

13.   A data compressing device which segments a
data string including at least one unit of data into
blocks forming vectors, searches a code book prepared

in advance for a code vector similar to a vector
extracted from a compression target, and outputs a
code corresponding to the code vector, characterized
by comprising:

first vector quantizing means for, for data at
each time in the compression target which changes
along a time axis, extracting blocks from the data,
searching a first code book for a code vector similar
to the vector, and outputting a code string
corresponding to the code vector at each time; and

second vector quantizing means for rearranging
difference results each calculated for codes at a
corresponding address in the code strings output from
said first vector quantizing means at respective
times between units of data adjacent in a time-axis
direction so as to generate new vectors, and for each
of the new vectors, searching a second code book for
a code vector similar to the vector, and outputting a
code string corresponding to the code vector.

14. A data compressing device according to claim
13, characterized by further comprising code string
rearrangement means for, of the code strings output
from said first vector quantizing means at each time,
calculating a difference for the codes at the
corresponding address between the units of data
adjacent in the time-axis direction, and combining
the differences at the corresponding address to
generate new vectors.

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15. A data expanding device which uses a data
string including at least one unit of data as a
vector, searches a code book having at least one code
vector for a code vector corresponding to a
compression code, and allocates the code vector to a
corresponding block position to reconstruct original
data, characterized by comprising:

second decoding means for searching the second
code book for a code vector corresponding to a code
string generated by said data compressing device of
claim 9 or 10 and outputting the code vector; and

first decoding means for rearranging code strings
each of which forms code vectors output from said
second decoding means to generate new vectors, and
for each of the new vectors, searching the first code
book for a code vector corresponding to a code string
which forms the new vector, and outputting the code
vector.

16. A data expanding device which uses a data
string including at least one unit of data as a
vector, searches a code book having at least one code
vector for a code vector corresponding to a
compression code, and allocates the code vector to a
corresponding block position to reconstruct original
data, characterized by comprising:

second decoding means for searching the second
code book for a code vector corresponding to a code
string generated by said data compressing device of

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claim 11 or 12 and outputting the code vector; and

first decoding means for rearranging results of addition for codes at the corresponding address between a code string which forms code vectors output from said second decoding means and the reference code string to generate new vectors, and for each of the new vectors, searching the first code book for a code vector corresponding to a code string which forms the new vector, and outputting the code vector.

17.   A data expanding device which uses a data string including at least one unit of data as a vector, searches a code book having at least one code vector for a code vector corresponding to a compression code, and allocates the code vector to a corresponding block position to reconstruct original data, characterized by comprising:

second decoding means for searching the second code book for a code vector corresponding to a code string generated by said data compressing device of claim 13 or 14 and outputting the code vector; and

first decoding means for, for the code string which forms code vectors output from said second decoding means, rearranging results of addition of codes in the order of addresses to generate new vectors, and for each of the new vectors, searching the first code book for a code vector corresponding to a code string which forms the new vector, and outputting the code vector.

18. A data compressing device according to any
one of claims 9 to 14, characterized by further
comprising time-axis shift means for, in generating
the new vectors, arranging elements in the new vector
while shifting the elements in the time-axis
direction at least between vectors close to each
other.

19. A data expanding device according to any one
of claims 15 to 17, characterized by further
comprising time-axis shift means for, in generating
the new vectors, arranging at least elements close to
each other in the new vector while shifting the
elements in the time-axis direction.

20. A data compressing device which segments a
data string including at least one unit of data into
blocks forming vectors, searches a code book prepared
in advance for a code vector similar to a vector
extracted from a compression target, and outputs a
code corresponding to the code vector, characterized
by comprising:

vector quantizing means for, of data strings at
times in the compression target which changes along a
time axis, combining data at a corresponding address
between units of data at the times to generate
vectors, searching the code book for a code vector
similar to each of the vectors, and outputting a code
string corresponding to the code vectors.

21. A data compressing device according to claim

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20, characterized by further comprising time-axis shift means for, in extracting the vectors, arranging elements in the vector while shifting the elements in the time-axis direction at least between vectors close to each other.

22. A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a compression target, and outputs a code corresponding to the code vector, characterized by comprising:

separation means for extracting at least one feature amount from the compression target and separating feature amount data from basic pattern data obtained by excluding the feature amount from the compression target,

wherein vector quantization is independently executed for each of the separated feature amount data and basic pattern data.

23. A data compressing device according to claim 22, characterized by further comprising

first vector quantizing means for, for each basic pattern data separated at each time by said separation means from the compression target which changes along a time axis, extracting blocks from the data, searching a first code book of basic patterns for a code vector similar to the vector, and

outputting a code string corresponding to the
vectors;

second vector quantizing means for rearranging
the code strings output from said first vector
quantizing means at respective times to generate new
vectors, and for each of the new vectors, searching a
second code book of basic patterns for a code vector
similar to each of the vectors, and outputting a code
string corresponding to the code vectors; and

third vector quantizing means for rearranging
data strings each constructing a feature amount and
separated by said separation means at each time from
the compression target which changes along the time
axis to generate new vectors, and for each of the new
vectors, searching a third code book of feature
amounts for a code vector similar to each of the
vectors, and outputting a code string corresponding
to the code vectors.

24. A data expanding device which uses a data
string including at least one unit of data as a
vector, searches a code book having at least one code
vector for a code vector corresponding to a
compression code, and allocates the code vector to a
corresponding block position to reconstruct original
data, characterized by comprising:

first decoding means for basic patterns, which
reconstructs original basic pattern data on the basis
of a code string related to a basic pattern output

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from said data compressing device of claim 22 or 23;

second decoding means for feature amounts, which reconstructs original feature amount data on the basis of a code string related to a feature amount output from said data compressing device of claim 22 or 23; and

synthesis means for synthesizing output results from said first and second decoding means to reconstruct the original data.

25. A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a compression target, and outputs a code corresponding to the code vector, characterized by comprising:

vector quantizing means for, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching the code book for a code vector similar to each of the vectors, and outputting a code string corresponding to the code vectors at each time; and

output control means for, for the code string output from said vector quantizing means at each time, obtaining correlation between codes at a corresponding address between units of data adjacent in the time-axis direction and outputting the code only for an address where the correlation is smaller

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than a predetermined value.

26. A data compressing device which segments a data string including at least one unit of data into blocks forming vectors, searches a code book prepared in advance for a code vector similar to a vector extracted from a color image as a compression target, and outputs a code corresponding to the code vector, characterized by comprising:

a code book for luminance signals and a code book for chrominance signals, said code book for luminance signals being assigned a larger number of code vectors than said code book for chrominance signals.

27. A data compressing device according to claim 26, characterized in that a compression rate of a Y signal as the luminance signal and U and V signals as the chrominance signals is 4 : 1 : 1 or 4 : 2 : 2.

28. A code book making method of making a code book which is formed from a set of vectors as data strings each including at least one unit of data and is to be used for vector quantization, in which vector quantization processing is repeatedly executed using certain sample data and an initial code book, and contents in a range designated on a virtual two-dimensional plane of the code book are updated in accordance with a predetermined update coefficient for every processing step so as to optimize the code book, characterized in that:

a code book of patterns each having a data value

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continuously changing from a minimum value to a maximum value of possible values is used as the initial code book.

29. A code book making method of making a code book which is formed from a set of vectors as data strings each including at least one unit of data and is to be used for vector quantization, in which vector quantization processing is repeatedly executed using sample data and an initial code book, and contents in a range designated on a virtual two-dimensional plane of the code book are updated in accordance with a predetermined update coefficient for every processing step so as to optimize the code book, characterized in that:

the range to be updated by one processing step is one-dimensionally applied on the virtual two-dimensional plane and the range is reduced as the number of times of update increases.

30. A code book making method of making a code book which is formed from a set of vectors as data strings each including at least one unit of data and is to be used for vector quantization, in which vector quantization processing is repeatedly executed using sample data and an initial code book, and contents in a range designated on a virtual two-dimensional plane of the code book are updated in accordance with a predetermined update coefficient for every processing step so as to optimize the code

book, characterized in that:

an initial value of the update coefficient to one value is set within a range of 0.3 to 1 and the value of the update coefficient is reduced as the number of times of update increases.

31. A code book making method of making a code book which is formed from a set of vectors as data strings each including at least one unit of data and is to be used for vector quantization, in which vector quantization processing is repeatedly executed using sample data and an initial code book, and contents in a range designated on a virtual two-dimensional plane of the code book are updated in accordance with a predetermined update coefficient for every processing step so as to optimize the code book, characterized in that:

a code book of patterns each having a data value continuously changing from a minimum value to a maximum value of possible values is used as the initial code book;

the range to be updated by one processing step is one-dimensionally applied on the virtual two-dimensional plane and the range is reduced as the number of times of update increases; and

an initial value of the update coefficient to one value is set within a range of 0.3 to 1 and the value of the update coefficient is reduced as the number of times of update increases.

a code vector similar to the vector, and outputting a
code string corresponding to the code vector.

51. A data compressing method in which a data
string including at least one unit of data is
segmented into blocks forming vectors, a code vector
similar to a vector extracted from a compression
target is searched from a code book prepared in
advance, and a code corresponding to the code vector
is output, characterized by comprising:

the first vector quantizing step of, for data at
each time in the compression target which changes
along a time axis, extracting blocks from the data,
searching a first code book for a code vector similar
to the vector, and outputting a code string
corresponding to the code vector at each time

the code string rearrangement step of, of the
code strings output in the first vector quantizing
step at each time, defining the code string of the
data at the certain time as the reference code string,
calculating a difference between the reference code
string and the code string of the data at another
time or between the codes at the corresponding
address, and combining the differences at the
corresponding address to generate new vectors; and

the second vector quantizing step of, for each of
the new vectors generated in the code string
rearrangement step, searching a second code book for
a code vector similar to the vector, and outputting a

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code string corresponding to the code vector.

52. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized by comprising:

the first vector quantizing step of, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching a first code book for a code vector similar to the vector, and outputting a code string corresponding to the code vector at each time;

code string rearrangement step of, of the code strings output in the first vector quantizing step at each time, calculating a difference between the units of data adjacent in the time-axis direction or between the codes at the corresponding address, and combining the differences at the corresponding address to generate new vectors; and

the second vector quantizing step of, for each of the new vectors generated in the code string rearrangement step, searching a second code book for a code vector similar to the vector, and outputting a code string corresponding to the code vector.

53. A data compressing method according to any one of claims 50 to 52, characterized in that the

code string rearrangement step comprises, in generating the new vectors, arranging elements in the new vector while shifting the elements in the time-axis direction at least between vectors close to each other.

54. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized by comprising:

the vector quantizing step of, of data strings at times in the compression target which changes along a time axis, combining data at a corresponding address between units of data at the times to generate vectors, searching the code book for a code vector similar to each of the vectors, and outputting a code string corresponding to the code vectors.

55. A data compressing method according to claim 54, characterized in that, in extracting the vectors, elements in the vector are arranged while shifting the elements in the time-axis direction at least between vectors close to each other.

56. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression

target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized in that:

at least one feature amount is extracted from the compression target, feature amount data is separated from basic pattern data obtained by excluding the feature amount from the compression target, and vector quantization for each of the separated feature amount data and basic pattern data is independently executed.

57. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector is output, characterized by comprising:

the vector quantizing step of, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching the code book for a code vector similar to each of the vectors, and outputting a code string corresponding to the code vectors at each time; and

the output step of, for the code string output in the vector quantizing step at each time, obtaining correlation between codes at a corresponding address between units of data adjacent in the time-axis direction and outputting the code only for an address

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outputting the code only for an address where the correlation is smaller than a predetermined value.

74. A data compressing device according to claim 25 or 73, characterized in that said output control means outputs the code string output from said vector quantizing means for some or all addresses independently of whether the correlation is smaller than the predetermined value at a certain time.

75. A data compressing device according to claim 74, characterized in that each of some addresses for which the code string is output independently of whether the correlation is smaller than the predetermined value is an address including adjacent blocks present in the data as the compression target or an address including discrete blocks present in the data as the compression target.

76. A data compressing device according to claim 74 or 75, characterized in that some addresses for which the code string is output independently of whether the correlation is smaller than the predetermined value are changed along with an elapse of time.

77. A data compressing method in which a data string including at least one unit of data is segmented into blocks forming vectors, a code vector similar to a vector extracted from a compression target is searched from a code book prepared in advance, and a code corresponding to the code vector

is output, characterized by comprising:

the vector quantizing step of, for data at each time in the compression target which changes along a time axis, extracting blocks from the data, searching the code book for a code vector similar to each of the vectors, and outputting a code string corresponding to the code vectors at each time; and

the output step of, for feature amount of each code vector searched in the vector quantizing step at each time, obtaining correlation between feature amounts at a corresponding address between units of data adjacent in the time-axis direction and outputting the code only for an address where the correlation is smaller than a predetermined value.

78. A data compressing method according to claim 57 or 77, characterized in that the output step comprises outputting the code string output in the vector quantizing step for some or all addresses independently of whether the correlation is smaller than the predetermined value at a certain time.

79. A data compressing method according to claim 78, characterized in that each of some addresses for which the code string is output independently of whether the correlation is smaller than the predetermined value is an address including adjacent blocks present in the data as the compression target or an address including discrete blocks present in the data as the compression target.

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80. A data compressing method according to claim 78 or 79, characterized in that some addresses for which the code string is output independently of whether the correlation is smaller than the predetermined value are changed along with an elapse of time.

81. A vector quantizing device which includes search means for searching template vector data similar to input vector data from units of template vector data stored and outputting a code of the searched template vector data, characterized by comprising:

search target selection means for, in executing the search, comparing a feature amount of the input vector data with a feature amount of the template vector data and selecting template vector data as a search target on the basis of a comparison result.

82. A vector quantizing device according to claim 81, characterized in that

said search means calculates a difference between each of elements of the template vector data and a corresponding one of elements of the input vector data and searches template vector data having a minimum Manhattan distance as a sum of absolute values of the differences; and

said search target selection means comprises

Manhattan distance calculating means for calculating the Manhattan distance M between certain

template vector data and the input vector data,

difference calculating means for calculating an absolute difference value D between a feature amount of the input vector data and a feature amount of another template vector data different from the certain template vector data, and

calculation omitting means for, when comparison between the Manhattan distance M and the absolute difference value D reveals a relation $M \leqq D$, omitting calculation of the Manhattan distance from the input vector data for another template vector data.

83. A vector quantizing device which has search means for searching template vector data similar to input vector data from units of template vector data stored and outputting a code of the searched template vector data, characterized by comprising:

feature amount storage means for storing a feature amount obtained for each of the units of template vector data in advance;

feature amount calculating means for obtaining a feature amount of the input vector data; and

search target selection means for selecting template vector data as a search target on the basis of the feature amount of each template vector data, which is stored in said feature amount storage means, and the feature amount of the input vector data, which is obtained by said feature amount calculating means.

84. A vector quantizing device according to claim 83, characterized in that

said search target selection means comprises:

difference calculating means for obtaining an absolute difference value between a feature amount of certain template vector data and the feature amount of the input vector data; and

calculation omitting means for, when the absolute difference value obtained by said difference calculating means is not less than a minimum value of a value representing similarity which is already obtained for another code vector, omitting calculation of the Manhattan distance for the certain template vector data.

85. A vector quantizing device according to any one of claims 81 to 84, characterized in that the input vector data is formed from image data.

86. A vector quantizing device according to any one of claims 81 to 85, characterized in that the feature amount is a sum, an average value, or DC components of values of elements of vector data.

87. A vector quantizing device according to any one of claims 81 to 85, characterized in that the feature amount is a sum, an average value, or DC components of values of some of elements of the vector data after the values are operated and inverted with reference to an intermediate value of possible values.

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88. A vector quantizing device according to any one of claims 81 to 85, characterized in that

the input vector data is a data string of a block formed from pixels on an image, and

the feature amount is a direction of change in value of each element of vector data in the block.

89. A vector quantizing device according to any one of claims 81 to 85, characterized in that

the input vector data is a data string of blocks each formed from pixels on an image, and

the feature amount is a form of change in value of each element of vector data in the block.

90. A vector quantizing device according to any one of claims 81 to 85, characterized in that the feature amount is variance of values of elements of vector data.

91. A vector quantizing device according to any one of claims 81 to 90, characterized in that said search target selection means selects the template vector data as the search target using feature amounts of different types.

92. A vector quantizing device according to claim 91, characterized in that said search target selection means compares a first feature amount of the input vector data with a first feature amount of the template vector data, narrows down a range of template vector data as search targets on the basis of a comparison result, compares a second feature

amount of the input vector data with a second feature amount of the template vector data, and further narrows down the range of template vector data as search targets on the basis of a comparison result.

93. A vector quantizing device according to any one of claims 81 to 92, characterized in that all elements of the vector data are divided into parts, and the template vector data as the search target is selected using a feature amount of each divided element.

94. A vector quantizing device according to any one of claims 81 to 93, characterized in that said search means executes search in the order of the feature amounts of the template vector data.

95. A vector quantizing device according to claim 94, characterized in that said search means executes search starting from template vector data which is determined to be closest to an answer on the basis of the feature amount of the input vector data and the feature amount of the template vector data.

96. A vector quantizing device according to claim 94 or 95, characterized in that the template vector data are arranged in a storage unit in the order of feature amounts, and the template vector data are multi-dimensionally arranged using feature amounts.

97. A vector quantizing device according to any one of claims 81 to 96, characterized in that said search means comprises:

two or more similarity calculating means for parallelly reading units of template vector data selected by said search target selection means as the search targets and parallelly searching for template vector data similar to the input vector data; and

template specifying means for specifying template vector data most similar to the input vector data on the basis of calculation results from said two or more similarity calculating means and outputting a corresponding code.

98. A vector quantizing method in which template vector data similar to input vector data is searched from units of template vector data stored, and a code of the searched template vector data is output, characterized in that:
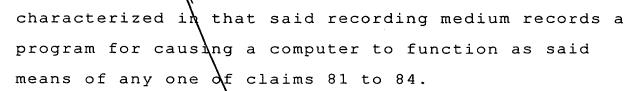
in executing the search, a feature amount of the input vector data is compared with a feature amount of the template vector data and template vector data is selected as a search target on the basis of a comparison result.

99. A vector quantizing method according to claim 98, characterized in that:

the search processing is to calculate a difference between each of elements of the template vector data and a corresponding one of elements of the input vector data and to search template vector data having a minimum Manhattan distance as a sum of absolute values of the differences, wherein,

as for a certain unit of template vector data, the Manhattan distance M is calculated between the template vector data and the input vector data, an absolute difference value D between a feature amount of the input vector data and a feature amount of another template vector data different from the above template vector data is calculated, and when comparison between the Manhattan distance M and the absolute difference value D reveals a relation M $\leqq$ D, calculation of the Manhattan distance from the input vector data is omitted for the other template vector data.

100. A vector quantizing device according to claim 98 or 99, characterized in that the template vector data is selected as the search target using feature amounts of different types.

101. A vector quantizing method according to any one of claims 98 to 100, characterized in that all elements of the vector data are divided into parts and the template vector data is selected as the search target using a feature amount of each divided element.

102. A vector quantizing method according to any one of claims 98 to 101, characterized in that units of template vector data are parallelly read as the search targets parallelly to search for template vector data similar to the input vector data.

103. A computer-readable recording medium

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characterized in that said recording medium records a
program for causing a computer to function as said
means of any one of claims 81 to 84.

104. A computer-readable recording medium
characterized in that said recording medium records a
program for causing a computer to realize the
function of any one of claims 91 to 95.

105. A computer-readable recording medium
characterized in that said recording medium records a
program for causing a computer to execute a
processing procedure of said vector quantizing method
of any one of claims 98 to 102.